The Journal of Thoracic and
Cardiovascular Surgery
July 1999

Commentary

The article by the group from the University of Virginia Health Sciences Center in Charlottesville rekindles the debate whether the "clamp-and-sew" strategy is safe in the surgical treatment of thoracoabdominal and descending thoracic aneurysms. Contrary to the increasingly dominant view based on a large body of experimental and clinical data in the literature, the authors answer this question in the affirmative on the basis of this limited clinical experience in 41 patients. They report a reduction in the operative mortality from 13.2% to 4.9% and in the overall rate of functional spinal cord injury from 9.9% to 2.4% in the recent cohort, quite an accomplishment in both cases. The authors advocate the use of the "clamp-and-sew" technique routinely in the treatment of thoracoabdominal aneurysms without any adjuncts currently accepted and used by many others for enhancement of spinal cord protection during these operations. They also believe that the addition of "attempted" preservation of the intercostal arteries has helped to reduce the prevalence of spinal cord injury after these operations, although the only variable that approaches significance in their statistical model for prediction of cord injury remains the extent of the aneurysm. These suggestions take us back to an era when our knowledge of the pathogenesis of the spinal cord ischemic injury was quite limited and our ability to formulate strategies to deal with this dreadful complication at best rudimentary.

The evidence in the undisputed literature proves that the two most important determinants of spinal cord injury in these operations are the following: (1) the duration of warm spinal cord ischemia during reconstruction, represented by the crossclamp time, and (2) the extent of aorta included in the resection (Crawford classification types I and II). It is also evident that more extensive aneurysms require longer crossclamp times for adequate reconstruction and thereby compromise the cord blood supply to a greater degree because of the increasing numbers of intersegmental vessels that are excluded in the resection. This leaves the spinal cord highly vulnerable to the development of immediate or late ischemic injury. Therefore it would not be a profound revelation to find a rather low rate of paraplegia if one could do these operations with a "limited period" of ischemia and at the same time could preserve the patency of the major intercostal arteries in the critical segment of the aorta. Whether this is possible with the "clamp-and-sew" technique in most cases of true thoracoabdominal aortic aneurysms in the real world is the big question. Regardless of how many "critical intercostal arteries" (each reimplantation adding to the

overall crossclamp time) are preserved, it is the crossclamp time that ultimately determines the risk and prevalence of paraplegia after these operations. As past experience has shown, this risk is substantial, even in the hands of "master surgeons" who could achieve speeds that we ordinary folk only dream of. I believe that the realization of this risk and the development of strategies to reduce it have been the most important advances of the past decade in the surgery of the descending and the thoracoabdominal aorta.

These advances were achieved at the end of a long and at times frustrating journey, a journey made more painful by articles like this one, which muddy the waters. The confusion created in the past was due largely to the mixing in of aneurysms primarily of the descending aorta (with low paraplegia risk) with aneurysms of the thoracoabdominal aorta, especially Crawford type I. By definition, any of the thoracoabdominal aneurysms in the Crawford classification will require at least three anastomoses if the critical intercostal arteries are preserved on a posterior tongue of the aorta in a beveled anastomosis, and they will require more if they are implanted on a Carrel patch. Anything else would signify either that the aneurysm is a true descending aneurysm misclassified as Crawford type I or that the operation was a compromise, leaving aneurysmal aorta involving the area of either the intercostal arteries or the visceral branches. I am puzzled by the fact that the authors have preserved the "critical intercostal arteries" with a Carrel patch in only 30% of their patients although Crawford type I and II aneurysms accounted for 66% of the same cohort. I am also astounded by the fact that they were able to carry out these repairs with as little as 12 minutes of ischemia. I cannot help admiring the authors' surgical dexterity in carrying out three or four anastomoses in 12 minutes. It frequently takes most of us more time than that just to get the entire clot out of the aneurysm and sort out the visceral branches, not to mention finishing three or more anastomoses. Undoubtedly, these very short crossclamp times are responsible for bringing the overall average ischemic time to the reported 30 minutes. However, this should not overshadow the fact that in 40% of the patients the crossclamp time was more than 30 minutes and in some as long as 110 minutes. This certainly is more in the realm of what most of us are accustomed to expect for these complex repairs if they are done correctly. Despite their substantial surgical facility, the authors have exposed almost half of their patients to the well-documented risk of prolonged cord ischemia without the benefit of adjuncts that can reduce the risk associated with longer ischemic times.

Current exposure of any patient to prolonged cord ischemia without adequate cord protection might at best be called an unwise choice by the surgeon. If the authors persist in this choice, it is reasonable to expect that the laws of probability will eventually but sadly catch up. I suspect that they fully realize this, and the appropriate "disclaimer" in the penultimate sentence of the article confirms my suspicion.

M. Arisan Ergin, MD
New York, NY
12/1/99784